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THE AUSTRALIAN TOMATO WEEVIL[1] INTRODUCED IN THE SOUTH:

(A PRELIMINARY ACCOUNT.)

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DISCOVERY IN THE UNITED STATES.

Another insect pest has been discovered very recently in the United States, a weevil which has been injurious in Australia for a number of years. While it is credited as favoring the potato and tomato as food, it is also a rather general feeder and there is danger that it may become of great importance like the sweet-potato weevil[2] unless measures are taken for its suppression. While recognized only in Mississippi, additional scouting may show that it is present in other States and in a larger part of Mississippi than now known.

On March 28, 1922, F. W. McHenry, of McHenry, Stone County, Miss., discovered this weevil injuring potato, tomato, and turnip plants in that vicinity and later advised the State entomologist, Prof. R. W. Harned, who notified the Federal Government of the finding. Experts of the Bureau of Entomology of the United States Department of Agriculture and of the Mississippi State Plant Board investigated the situation as soon as possible and on April 8 weevils were found to be very numerous, although serious damage was not then evident.

This species, which had not hitherto been recognized as occurring in the United States, is confined to southern Mississippi where it was first found to infest about 350 square miles. Double this area has been found by further scouting, chiefly by the Mississippi State Plant Board in cooperation with the Bureau of Entomology. It has been known as a pest since about 1908 in Australia, where it has received attention by the Australian entomologists, W. W. Froggatt, Chas. French, jr., and A. M. Lea, from whose accounts[3] portions of this paper have been taken.

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[1] *Desiantha nociva* Lea; order Coleoptera, family Curculionidae.
[2] *Cylas formicarius* Fab.
[3] See footnotes 6, 7, and 8.

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THE BEETLE.

This pest (Fig. 1) is a small or medium-sized snout-beetle or curculio known as *Desiantha nociva* Lea. It is about one-third of an inch long, dull grayish brown, and the elytra or wing-covers bear a pale gray V-shaped mark. The prothorax is much widened in front. The beak is short and stout, and from it proceeds the elbowed antennæ or feelers, each bearing a club at the tip, as usual in the weevils. The body is coated with buff and gray scales scattered with hairs and is so uniform in color that the beetle is likely to evade detection when resting on the soil, especially when the legs are folded under the body. In this respect it furnishes a good example of protective resemblance. This species is provided with well developed wings. The male is unknown.

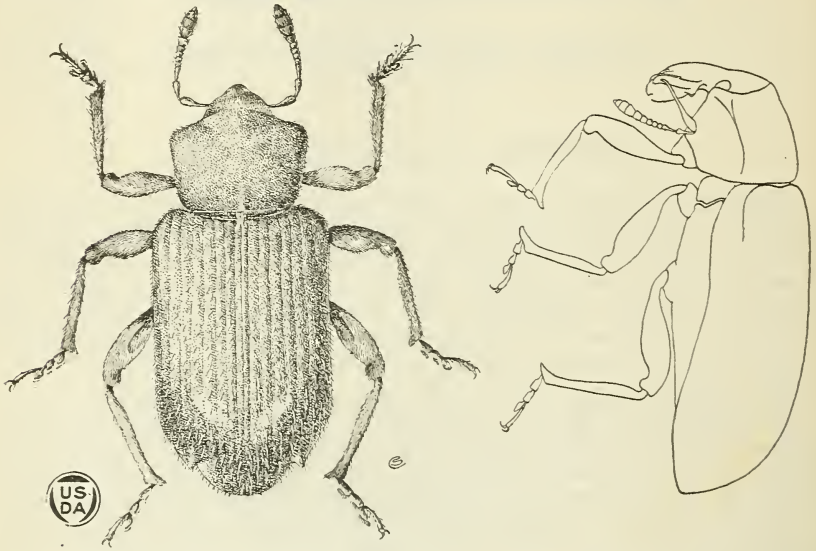

FIG. 1.—Adult of Australian tomato weevil: At left, view from above; at right, side view in outline. Greatly enlarged.

THE LARVA.

The larva (Fig. 2, at right), as represented by preserved specimens, is of the usual curculionid form, somewhat slender, strongly convex, and is strongly depressed on the ventral surface. It is of the usual arcuate form, when preserved. The body color is pale green (specimens in alcohol are greenish, gray, or milk white) and the head is pale yellow, variegated with a series of brown lines forming a distinct pattern (Fig. 2, at left). The mouth parts are black. The prothoracic shield is narrow, narrowly divided at the middle, paler than the head, and, like the latter, bears a pattern of dotted lines, although these are much fewer than on the head. The ventral surface and, apparently, the sides, a little below the stigmata, bear flexible fleshy joints from each of which projects a proleg, which evidently serves the larva in crawling as well as in grasping the foliage

on which it subsists. This structure would seem to adapt it to a life during this stage similar to that of the larva of the clover-leaf weevil,[4] which it somewhat resembles. Possibly also it varies somewhat in color in the different instars, as does the larva of the clover-leaf weevil. The stigmata are small, black, and distinct.

When fully grown the larva is about one-half inch (12 millimeters) long and is about one-fourth as wide.

The larva of this species, in comparison with those of the other two related genera of injurious weevils, does not possess the spinous hairs on the prothoracic segments that occur in both Hypera and Listronotus proper.[5]

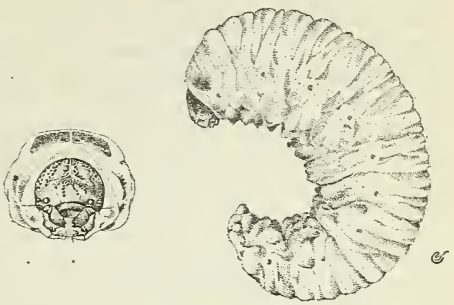

FIG. 2.—Larva of Australian tomato weevil: Side view at right; head and prothorax, front view, at left. Greatly enlarged.

THE PUPA.

The pupa (Fig. 3) is a little shorter than the adult or beetle. The broad rostrum or beak extends flattened forward to about the middle of the first pair of legs. The vertex is ornamented with a pair of short, stiff, blackish spines and similar spines occur between the eyes, while between the last spines and the apex of the beak is another pair. Similar spines exist at the apex of the prothorax on each side and at the knees and many are present on the apical joints of the abdomen and on the dorsum of all the abdominal joints.

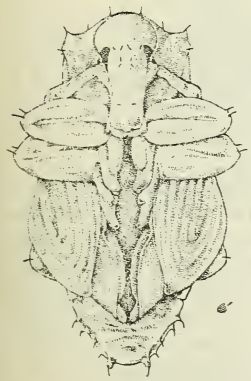

FIG. 3.—Pupa of Australian tomato weevil. Greatly enlarged.

Available material freshly preserved in alcohol shows in many individuals colors as follows: Rostrum white, legs and wing-pads pale yellow, abdominal segments pale green.

The pupa is a little more than one-fourth of an inch (7 millimeters) long.

ORIGIN AND DISTRIBUTION.

The original habitat of the Australian tomato weevil is doubtful, as is also its proper scientific name. It was described from Australia by Lea in 1908,[6] and he and others were of the opinion that it was congeneric with other injurious species in that country. On the other hand, there are excellent reasons for the belief that the species might originally have been introduced into Australia from South America, the climates being similar, and pre-

[4] *Hypera punctata* Fab.

[5] As exemplified in the parsley stalk-weevil, *Listronotus latiusculus* Boh., its nearest injurious relative in the United States. (See U. S. Department of Agriculture, Bureau of Entomology Bul. 82, p. 15, fig. 3, *b*, *c*, 1909.)

[6] Lea, Arthur M., Descriptions of Australian Curculionidae, with notes on previously described species. Part VII. *In* Trans. and Proc. and Rpt. Royal Soc. S. Australia, v. 33, p. 145–197. 1909. See p. 174–175.

sumably from Chile. It has been surmised that this could readily have taken place with its principal food plants, the potato, tomato, or turnip, but nothing definite is known.

The time of the year when the weevil is most abundant in the United States, from November until April, furnishes an additional reason for believing that the species has been accidentally introduced into the United States from one of these countries of the southern hemisphere, for as a general rule their insect pests are more destructive during the winter months. Whatever its derivation, there is strong probability that it may be confined in this country for a long period of years to the Southern States, since it could hardly adapt itself readily in a short period to the much lower winter temperatures of the North. Then, again, the fact that it is apparently very slow in flight, as in the case of the sweet-potato weevil, would tend to keep it in the Gulf region, where the sweet-potato weevil has taken up permanent residence from abroad.

In the writer's opinion, it is best that the species be known for the present as *Desiantha nociva* Lea, since authorities on Coleoptera who have been consulted and who have studied the species state that although it probably belongs to the old genus Listroderes, it does not belong to Listronotus, and the true genus remains in doubt.

It has already been mentioned that one difference between the larva of Desiantha, as we now know it, and that of Listronotus, is that the former is without ambulatory spinous processes on the prothoracic legs and that these are well developed in Listronotus and are indicated in Hypera.

OCCURRENCE IN THE UNITED STATES.

The present known distribution of the Australian tomato weevil in the United States (Fig. 4) shows it to be established only in Mississippi, in the following localities: Biloxi, Gulfport, Long Beach, Lyman, Landon, and Saucier, in Harrison County; McHenry and Wiggins, in Stone County; Pearl River County; Hancock County; and Ocean Springs in Jackson County.

This pest first attracted attention inland and afterwards was found along the coast. As the species is a prolific breeder and since it occurs widely along the Gulf coast, it is a menace to the neighboring States of Alabama and Louisiana, and, unless action is taken for its suppression, it may in time spread eastward to western Florida and westward through Louisiana and eastern Texas until it overruns the Gulf States and becomes a pest like the sweet-potato weevil. There is also, of course, the danger of its migration northward.

Although it is not positively known that this insect is likely to be spread in shipments of tomato, turnip, and other plants, nevertheless such shipments should be guarded as closely as possible to avoid the chance of its distribution in this manner to noninfested territory. Undoubtedly the species will increase its list of food plants, and in another year or two will be discovered in new localities. There is also a possibility that the species may be carried in earth from infested to noninfested regions, and at any time during the year. Our lack of knowledge of this subject shows plainly the necessity of additional study of the pest.

HABITS IN AUSTRALIA.

In Australia this and related forms of similar habits are not only field but orchard pests. The present species attacks carrots in Australia, whence a local name, carrot weevil. It is also stated to attack and injure the buds of plum and other fruit trees and vines.

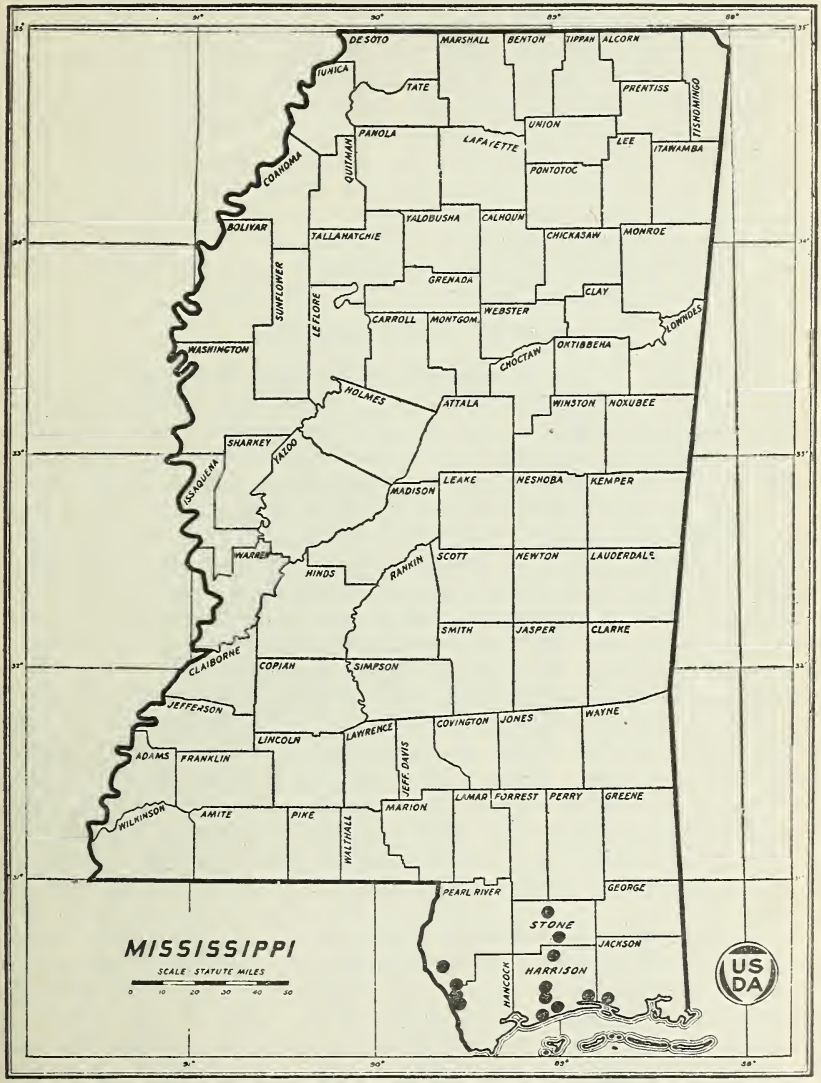

FIG. 4.—Map of Mississippi showing localities known to be infested with Australian tomato weevil.

Both in Australia and in this country it has been noted that this weevil is nocturnal in habits, which is true of many related forms. French,[7] writing in 1911, has made the statement that the weevils are

[7] French, C., A handbook of the destructive insects of Victoria, Pt. V. Melbourne, 1911. See Ch. CXI, Tomato weevil, p. 41–43.

sometimes found by thousands in gardens and that they destroy nearly all forms of vegetables. For example, one grower reported the loss of 80 tomato plants in one night, and that during a single evening he alone had collected no less than 638 beetles in the course of an hour, and estimated that in a week's time he had captured and destroyed thousands. The weevil does not confine itself to foliage but devours entire plants. The fact that it shows a strong inclination to be omnivorous in Australia, in feeding both on vegetables and the buds of fruit trees and vines, indicates that in a new environment it might extend its range of food plants and attack such valuable crops as tobacco and eggplant, because of their close relationship to the solanaceous plants which the species appears to prefer. To date, however, no attack has been observed on any of these crops.

In treating of this species under the name of the "buff-colored tomato weevil," Froggatt [8] stated that the larvæ or grubs are slender, active, and pale green, and quite unlike the typical curculios. From this it was judged that the larva is probably not entirely unlike that of the clover-leaf weevil,[9] which has proved to be the case.

HABITS IN MISSISSIPPI.

E. K. Bynum, of the Mississippi State Plant Board, who is especially charged with work on this pest, found that the beetles, after aestivation, had begun to renew activities on November 18, 1922. He succeeded in rearing the adult from the larva and on one occasion picked up 60 larvæ in 30 minutes by scratching the soil with a stick.

He further states that the larvæ hatch in the soil, find shelter underground, and at night venture forth to feed upon the bark and foliage of plants, that they pupate in the earth, and that the perfect beetles emerging from them do more harm than the larvæ.

The lateness of the season when the injurious habits of the weevil were reported in Mississippi prevented detailed experiments, because by May they were beginning to disappear. It was noticed, however, that the beetles find concealment under clods of earth and other débris in fields and gardens, and hide either just below the surface of the soil or under plants, including others than their preferred food plants. When disturbed the weevils drop quickly, but move somewhat slowly and awkwardly. The weevils in confinement eat along the edges of leaves and also eat holes in the interior, devouring leaf veins and leaf stems, and severing them in places. Thus far it has not been noticed that the weevils are attracted to lights.

As an instance of how little is known of the natural habits of this weevil, it is only necessary to mention that some observers claim that the beetle is quite active on foot and others that it is slow, with the preponderance of evidence in favor of the latter view. Observations continued by Mr. Bynum during the spring of 1923 showed that the species disappeared before the middle of April. It was also determined that both beetles and larvæ attacked practically all portions of their food plants growing above ground, including the root of turnip (Figs. 5 and 6.) On potato, injuries were observed in the

[8] Froggatt, Walter W., The buff-coloured tomato weevil (Desiantha nociva). *In* Agricultural Gazette N. S. W., p. 1065–1066. 1915.

[9] *Hypera punctata* Fab.

FIG. 5.—**Turnip plant, including root, showing work of beetle and larva of the Australian tomato weevil.**

form of scars along the stems, in extreme cases causing the severance of the stem from the plant.

Thus far not a single pair of weevils has been observed mating, although eggs have been obtained.

CONTROL.

As to control methods, much remains to be learned. In confinement, lead arsenate sprayed on tomatoes killed all of the beetles within 24 hours. Mr. Bynum [10] reports that at McHenry, Miss., lead

FIG. 6.—Turnip roots in sections showing work of larvæ of Australian tomato weevil. (Bynum.)

arsenate was very effective against the adults, two applications bringing the pest under control where it was severely damaging Irish potatoes; also, that at Biloxi, Miss., where turnips were being badly damaged, 90 per cent of the larvæ were killed with a spray of lead arsenate at the rate of 1 and 2 pounds to 50 gallons of water. In case plants are sprayed for other insect pests when the weevils or their larvæ are present, this will probably effect the control of the tomato weevil. Calcium arsenate would probably be equally effective either as a dust or spray and a little cheaper, and it is not unlikely that the distribution of poisoned baits would be effective. Wherever inspectors have been working on this insect and have collected much material, it has been noticed that visits which have been paid afterwards to the same localities have shown a considerable reduction in the numbers of the pest.

[10] Bynum, E. K., Controlling the Australian tomato weevil, *Desiantha nociva*. In Quart. Bul. State Plant Bd. Miss., v. 3, no. 1, p. 22–24. April, 1923.